

Developing a Lake Erie Shore Erosion Management Plan



Ohio Department of Natural Resources
Office of Coastal Management



Proposal for:
NOAA Coastal Services Center
Coastal Management Fellowship



Submitted by: _____

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Introduction

The Ohio Department of Natural Resources (ODNR), Office of Coastal Management (OCM) is seeking a Coastal Management Fellow from the NOAA Coastal Services Center to aid in the development of the next phase of the Ohio Lake Erie Shore Erosion Management Plan.

Background

Created in 2002, the OCM is responsible for administering the Ohio Coastal Management Program (OCMP) as approved by NOAA in 1997. The OCMP document identifies several priority coastal management issues, including Coastal Erosion and Flooding and Ecologically Sensitive Areas. Erosion of the shoreline and the loss of important ecological areas have also been identified as a priority in the “Lake Erie Protection and Restoration Plan” produced by the Ohio Lake Erie Commission in 2000.

As outlined in the current OCMP program document, erosion along the Ohio shore of Lake Erie is a serious problem, requiring increased attention and effective action by the state. A century ago, sand beaches fronted most reaches of the Ohio shore of Lake Erie. Along the high-bluffed shore east of Cleveland, the beach was used as a roadway by settlers coming to Ohio. Today, many beaches have disappeared due to erosion. In their place are numerous (approximately 4,000) erosion control structures built to protect urban development. Many remaining beaches exist only because of the presence of artificial structures meant to trap sand, and these structures create impacts to beaches along the adjacent shores. Where natural beaches remain, they are narrow and segmented and provide little natural protection from erosion.

Despite the presence of these erosion control structures, each year nearly 1.6 million tons of material is eroded along Ohio's lakeshore, with significant and far-reaching implications for public safety, health and welfare. Record-high lake levels in the early 1970s and again in the mid 1980s and 1990s caused extensive damage to residential, commercial, industrial and agricultural property. Beaches were inundated by high lake levels and eroded by waves, leaving structurally unprotected bluffs more vulnerable to wave erosion. Erosion of dikes and barrier beaches exacerbated wetland loss, negatively affecting coastal wildlife populations, overall water quality and the natural capacity of the environment to absorb flood waters.

The material eroded along the shore each year mainly consists of fine-grained sediment from glacial tills that disperses in the lake, resulting in increased water turbidity and sedimentation rates. Increased turbidity reduces recreational opportunities and increases treatment costs for public water supplies. Increased sedimentation disrupts valuable aquatic habitats, damaging fishery resources and the commercial and recreational fishing industries they support.

The effects of erosion on the Ohio shore of Lake Erie have been documented by the ODNR over the last 50 years. Field studies examined the modern physical setting (e.g., shore stratigraphy, shore relief, shore orientation, beach width, nearshore slopes, nearshore sediment, water depths and wave climate) and cultural setting (e.g., land use, shore protection structures) that influence the rate of shore erosion and recession, both temporally and geographically. Historical charts and aerial photographs document temporal changes in the physical and cultural settings.

Although much of the Ohio lakeshore is composed of materials easily eroded by waves, erosion rates vary over time and from place to place. Natural factors such as shore composition, beach distribution, nearshore depths, storm frequency, lake level and shoreline orientation contribute to these variations. Man-made erosion control structures and offshore disposal of sand dredged from harbors also contribute to these variations and often aggravate existing conditions or create new erosion problems.

Along some reaches, erosion control structures have slowed erosion with minimal apparent adverse impact, while along many other reaches, armoring the shore has been detrimental. Despite adverse impacts associated with some erosion control structures they are an integral part of the Ohio lakeshore. Without them, many of the buildings located near the bluff edge would now face an even greater threat from erosion. Proper design of new erosion protection structures is critical, as well as the consideration of the benefits of nonstructural erosion control measures, combinations of structural and nonstructural measures and wise land use. The value of natural barriers and nonstructural shoreline stabilization measures designed to mimic, enhance or restore natural stabilization systems needs to be demonstrated.

The variability of the Lake Erie shoreline combined with the amount of development presents a unique coastal management challenge. Erosion control methods are typically driven by the local contractor rather than by what scientifically has proven best for the specific site conditions and environmental concerns. Although historical erosion management plans exist, none have ever been implemented, and significant changes to the shoreline have necessitated the creation of a new plan. A substantial amount of scientific research and historical data exists, but this information has not been integrated, evaluated and incorporated into a single document for erosion management.

The role of the OCMP in addressing coastal erosion and flooding and the loss of ecological shoreline habitat

Coastal management issues related to Coastal Erosion and Flooding have been described in the OCMP program document and are integrated within the 41 OCMP management policies. Five of these policies,

- Policy 1 – Lake Erie Coastal Erosion Area Management
- Policy 2 – Shore Erosion Control
- Policy 3 – Floodplain Management
- Policy 4 – Flood Protection and Mitigation
- Policy 5 – Shore Erosion and Flood Hazard Mitigation

form the foundation of the OCMP's response to Coastal Erosion and Flooding issues in Ohio.

Upon approval of the OCMP by NOAA in 1997, ODNR initiated several projects to address the issues of Coastal Erosion and Flooding along Ohio's portion of Lake Erie. One of these projects was the development of a Lake Erie Shore Erosion Management Plan.

As outlined in Policy 2 - Shore Erosion Control, ODNR was directed “*to promote sound decisions regarding control of shore erosion by developing a plan for the control of shore erosion*”. In addition to Policy 2, ODNR is statutorily mandated to prepare a “*plan for the management of shore erosion in the state along Lake Erie*” and develop a program “*to provide technical assistance*” to the public regarding coastal erosion issues. (§ 1521.29 ORC).

As a result, in 1998 ODNR contracted with a private consultant to prepare a needs assessment for a Lake Erie Erosion Management Plan. This contract resulted in the production of a Conceptual Design Report (CDR) for a Lake Erie Shore Erosion Management Plan (LESEMP). The CDR outlines a multi-phase approach to developing a LESEMP, with an initial focus on acquiring capabilities and infrastructure within ODNR to collect data on the coast and coastal areas, collecting and reviewing available coastal information from within ODNR, and seeking other data that may provide useful in developing the LESEMP from other coastal partners. This project has been coordinated with other previous and ongoing efforts by ODNR, including the Lake Erie GIS project, the Lake Erie Coastal Atlas, and the Coastal Geology Atlas.

The next step in developing the LESEMP is to synthesize the information gathered through these efforts, locate information gaps that exist, draw conclusions based upon the information, and incorporate those conclusions into an erosion management plan that provides the foundation for solutions to Coastal Erosion and Flooding based on scientific research, the needs of coastal communities and property owners, and the need to protect and restore critical ecological resources.

Goals and Objectives

The LESEMP will establish a plan for local communities and individual property owners to use in addressing Lake Erie based erosion and flooding concerns in conjunction with the restoration of some of the shore and nearshore habitats and resources along Ohio’s Lake Erie Coast. The plan will be used by the OCM to support policy development that will focus on protecting and restoring valuable coastal property. Specific issues to be looked at as part of this plan may include sand resources, beach preservation, types of structural and non-structural solutions to erosion problems, historical performance and monitoring of shore structures, effects of armoring the shore, engineering design guidance, and public education and outreach.

The goal is to prepare a shore erosion management plan that is integrated with all levels of stakeholders. The plan will identify partnerships between Federal, State and local governments and identify opportunities for funding so the projects can be implemented comprehensively. The plan will utilize information available from existing and future erosion studies and master plans and will integrate comparable efforts being undertaken by other Federal, State and Local agencies. The plan will also continue to be integrated with the Lake Erie GIS project, which will support the development and implementation of the overall shore erosion management plan, and portions will be eventually be included in updates to the Lake Erie Coastal Atlas.

Project Description, Milestones and Outcomes

Orientation

The Coastal Fellow will be introduced to management and staff from the Office of Coastal Management and partner divisions and agencies. The fellow will review relevant information from the OCMP regarding the coastal issues and policy challenges that ODNR faces. The fellow will participate in field visits with team staff to become familiar with the Ohio Lake Erie shoreline. Additionally, the fellow will participate with coastal staff in interagency meetings and outreach activities to learn what resources are available and evaluate various entities' needs.

Outcomes:

- Familiarity with Ohio Coastal Management Program, Office of Coastal Management Staff, and Geography of Ohio's Lake Erie Coast.(Year 1, Quarter 1)

Outreach and Public Education

Outreach and public education will be a task that the Coastal Fellow will perform throughout the two-year project period. The Coastal Fellow will be responsible for developing contacts at local communities and other state and federal agencies within the Lake Erie Coastal Zone, which includes portions of nine counties. The Coastal Fellow will meet with these contacts at various stages of the project to ensure that the stakeholders have input in the shore erosion management plan. Examples of these agencies and organizations include the following:

- Coastal advisory councils;
- Local watershed groups;
- City and County Planning Commissions;
- Soil and Water Conservation Districts;
- Local government officials;
- Ohio Environmental Protection Agency;
- United States Army Corps of Engineers.

Additionally, the Coastal Fellow will provide public education by assisting the OCM in preparing and presenting LESEMP information at public meetings throughout different stages of the project.

Further details related to public meetings, outreach products and stakeholder input are included in Attachment A. This attachment is a portion of OCM's Coastal Outreach and Public Education plan. Objective 5, Action 4 relates specifically to the LESEMP.

Outcomes:

- Development/strengthening of relationships between the Office of Coastal Management and project stakeholders (Years 1 & 2, Quarters 1, 2, 3, 4)
- Encourage public involvement in Ohio's Coastal Erosion and Flooding issues through public meetings

Research Existing Information

The Coastal Fellow, with assistance from the OCM staff, will research and evaluate information from a variety of sources. Both historical and current information will be utilized.

Four types of sources of information have been identified and categorized as follows. Specific data sources that are known have been listed. Additionally, the fellow will identify other data sources not listed below within each category.

1) Policy and Regulatory Authorities

The agencies contacted as part of the earlier planning phase of the LESEMP project should be contacted. These include but are not limited to the following:

- Louisiana Department of Natural Resources and Department of Environmental Quality;
- Maine Department of Environmental Protection;
- Wisconsin Department of Administration – Coastal Management Section and Wisconsin Department of Natural Resources;
- University of Wisconsin Sea Grant Institute;
- NOAA Coastal Services Center;
- The Heinz Center for Economics and the Environment;
- United States Army Corps of Engineers (USACE);
- Ohio State University; and
- Ohio Environmental Protection Agency (OEPA).

2) Related Projects

Review of related projects in other states, at the federal level and within other agencies within Ohio. These programs may include:

- USACE, WRDA Section 1135;
- USACE, WRDA Section 227 National Shoreline Erosion Control Development and Demonstration Program;
- USACE Upper Great Lakes Potential Damages Study;
- USACE Lower Great Lakes Erosion Study;
- Other state coastal program erosion and/or flooding management plans.

3) Historic Erosion Studies and Management Plans

Review the following studies as well as others not listed.

- State of Ohio, Department of Natural Resources, Division of Shore Erosion Master Plan
- USACE Beach Erosion Control Report, Shoreline of Lake Erie Ohio-Michigan Line to Marblehead, Ohio (July 1959)
- Division of Geological Survey Lake Erie Erosion and Flooding Reports

4) Coastal Resources

Review the inventory of coastal resources/characterization of Ohio's Lake Erie Coastal Management Area gathered as part of the Ohio Lake Erie Coastal Atlas project and research additional sources of information. Coastal resources/characterizations to be targeted as part of this project include the following:

- Habitat
- Sand Resources/Littoral Transport
- Geology of the Ohio Lake Erie Shoreline and Nearshore System
- Nearshore Bathymetry (SHOALs data, LIDAR Imagery)
- Development within the Coastal Zone

Outcomes:

- Written summaries of related programs in Ohio, other states and at the federal level (Year 1, Quarter 2)
- Review of similar efforts currently being undertaken by other agencies, status, summary and identification of potential partnerships (Year 1, Quarter 3)
- Review relevant historic and current information, determine where gaps exist and whether historic information is still applicable and how it can potentially be used. (Year 2, Quarter 1)

Identify Additional Information Required

The Coastal Fellow, with the assistance of the LESEMP team, will prepare a document that lists gaps in existing information and identifies policy related issues. Options for obtaining this information will be explored and additional studies and projects will be identified. The document will prioritize projects by order of importance for completion of subsequent phases of the LESEMP.

Outcomes:

- Recommendations for further research to be performed. (Year 2, Quarter 1)
- Identification of policy related issues to be addressed in Draft Guidance Document (Year 2, Quarter 2)

Draft Guidance Document

The Coastal Fellow, with the assistance of the OCM staff, will use information gathered during the research and identification phases of this project to prepare a Draft Guidance Document that will assist local communities and individual property owners in managing Lake Erie based erosion and flooding while restoring the resources along Ohio's Lake Erie Coast, including the shore and nearshore habitats. This Draft Guidance Document will be a part of the overall LESEMP plan and will include recommendations to be used by the Office of Coastal Management and local communities to support policy development that will focus on protecting and restoring valuable coastal property, sand resources, beaches, and critical coastal habitat.

The Draft Guidance Document will be integrated with all levels of stakeholders, will identify partnerships between Federal, State and Local governments, and identify opportunities for funding so that projects can be implemented comprehensively. The draft guidance document will utilize information available from existing and future erosion studies and master plans and will be integrated with comparable efforts being undertaken by other Federal, State and Local agencies. The Draft Guidance Document will also be integrated with the Lake Erie GIS project, which will support the development and implementation of the overall plan.

Fellow Mentoring

The Coastal Fellow will be mentored by April Dunlap, a coastal engineer and lead for the OCM LESEMP. April will be the primary contact for administrative questions and project guidance. The Coastal Fellow will also be assisted by Steve Holland, the Ohio OCMP Federal Consistency Coordinator, in networking with other coastal partners, and by Steve Lewis, who is responsible for OCM's efforts with the Lake Erie GIS.

The Fellow will be considered part of the Coastal Engineering Group within OCM, and will be expected to attend staff meetings and participate in program discussions. Opportunities will be provided to join staff on field visits, in internal and external meetings, and at a range of regional events. The Fellow will receive assistance in identifying key individuals to meet with, direction on where to find important sources of background information, and will be provided with the necessary technical resources and training to carry out the project.

The Fellow will be provided with opportunities to meet and work with other coastal professionals in government, associations, groups, and academic institutions. The Fellow will be encouraged to present their work at regional and national meetings, and to publish portions of their work as appropriate.

Project Partners

The ultimate success of this project will be determined by the involvement of the project stakeholders at the local, state, and federal levels. The Office of Coastal Management is committed to working with network partners at each stage of the project. Potential partners include:

- Local government and non-profit organizations
- Ohio Department of Natural Resources
 - Division of Geological Survey
 - Division of Mineral Resource Management
 - Division of Natural Areas and Preserves
 - Division of Parks and Recreation
 - Division of Soil and Water Conservation
 - Division of Watercraft
 - Division of Wildlife
- Ohio Environmental Protection Agency
- Ohio Lake Erie Commission

- Ohio Sea Grant
- Ohio State University
- Old Woman Creek National Estuarine Research Reserve
- National Oceanic and Atmospheric Administration
- United States Army Corps of Engineers
- United States Fish and Wildlife Service
- United States Geological Survey
- United States Environmental Protection Agency
- Great Lakes Commission

Cost Sharing

Fellows will have all the amenities and services of agency staff including office space and equipment, personal computer and telephone, fax, e-mail access, and use of agency vehicles. In addition, funds will be provided for administrative travel, technical training opportunities, and purchases of data products, supplies, and software.

Funding for cost sharing (7,500 in year 1, 7,500 in year 2) has been budgeted for the Fellow and included in the Office of Coastal Management's budget plan for the next two years.

Office administrative support is available, as well as networked computers, a GIS and Mapping center, and Internet capabilities. The Office of Coastal Management has a T1 line connected to the Ohio Department of Natural Resources server, as well as an in-house server located in Sandusky. The Fellow will have a networked personal computer for his/her use. A state printer, plotter, and copy center is located in the Sandusky office with large format and color copy capabilities.

2004-2009

Coastal Outreach and Public Education

OPPORTUNITY STATEMENT:

This Coastal Outreach and Public Education plan sets forth goals, strategies and timelines for providing information to coastal communities and decision makers regarding Lake Erie, coastal resources and Ohio's Coastal Management Program in order to enhance the lives of Ohioans and countless others in and visiting the Great Lakes ecosystem.

- Inform Citizens - Encourage Cooperation

GOALS:

- 1) Increase protection, restoration and enhancement of Ohio's coastal resources.**
- 2) Increase public and private knowledge of the Ohio Coastal Management Program and Office of Coastal Management.**

OBJECTIVES:

- 1) Increase internal and external understanding about Ohio's coastal ecosystem and the region's relationship to prosperous coastal communities.**
- 2) Increase and improve communications to better understand communities' needs and enhance outreach activities with Ohio's coastal partners.**
- 3) Develop stronger relationships with other Great Lakes states' coastal management programs to promote ecosystem recognition.**
- 4) Promote grant information exchange to better serve coastal needs internally and externally.**
- 5) Improve education materials, outreach and training regarding coastal regulations and environmental laws.**

ODNR Strategic Plan 2004-2010

LAKE ERIE

We will protect, conserve and improve Lake Erie and its coastal resources to enhance outdoor recreational opportunities, support economic development and nurture a safer, healthier Great Lakes ecosystem.

Lake Erie Initiatives:

Coastal Management:

Strengthen Ohio's Coastal Management Program and improve partnerships with lakefront landowners, communities and other stakeholders to protect Lake Erie's coast.

PUBLIC EDUCATION and AWARENESS

We will promote a conservation ethic among Ohioans based on an understanding and appreciation of Ohio's natural resources.

PEA Initiatives: Educational Outreach

Ensure public understanding of – and positive response to – issues critical to the department's mission by improving the coordination and outreach of our educational and awareness efforts.

Coastal Outreach and Public Education 2004-2009

GOALS:

- 1) Increase protection, restoration and enhancement of Ohio's coastal resources.
- 2) Increase public and private knowledge of the Ohio Coastal Management Program and functions of the Office of Coastal Management.

OBJECTIVE 5:

Improve education materials, outreach and training regarding coastal regulations and environmental laws.

ACTIONS:

- 1) Provide revised coastal guidance materials to reflect legislative changes to coastal regulations and make materials more user friendly.
- 2) Work with the public and local communities to increase the understanding of coastal regulations.
- 3) Encourage engineers designing coastal structures to participate in coastal engineering training activities
- 4) **Establish Lake Erie Shore Erosion Management Plan.**
- 5) Coordinate with coastal partners to ensure coastal regulations and environmental laws outlined in the OCMP are properly enforced.

OBJECTIVE 5: Improve education materials, outreach and training regarding coastal regulations and environmental laws.

ACTIONS	PROJECTS	MEASURED	TARGET	DRIVER	ACHIEVEMENTS
Establish Lake Erie Shore Erosion Management Plan.	MANUAL	Manual generated, distributed and made available on the internet.	August 2007	Engineers, Fellow with assistance by PIO	Project commenced in September 2004.
STEP	Provide regular updates on LESEMP at Coastal County Initiative meetings to gain input on the plan from local and county decision makers.	Attend meetings Provide updates, gain input.	Ongoing	Chief, PIO, Fellow, Engineers.	
STEP	Apply for NOAA Coastal Fellow to assist with the additional workload establishing an Erosion Management Plan.	Fellowship Application Sent	Fall 2004	Engineers	OCM was awarded a coastal fellow in 2004. Fellow will be matched with Office in Spring 2005. PRESS RELEASE announced achievement.
STEP	Host 1-3 public kick-off meetings to describe what a shore erosion management plan is, why the Lake Erie Shore Erosion Management Plan is needed, what we hope to accomplish with the plan, and to seek input, answer questions/ listen to concerns that the public may have.	Press Release announcing meetings. Send invitations to engineers, contractors, soil/watershed groups, etc. Host meetings.	August or September 2005	Fellow, Engineers, PIO	

ATTACHMENT A

STEP	Create Web page(s) on Coastal Science/ News Publications section regarding the Lake Erie Shore Erosion Management Plan.	Web page created and regularly updated.	Summer 2005	PIO, Engineers	
STEP	Keep public informed of any project updates via OCM Newsletter and Website.	1-2 updates in newsletters. Quarterly updates on-line.	Begin after Spring 2005.	Fellow, PIO	
STEP	Host 2-3 public meetings to present to the public a "Draft" final product.	Press Release announcing meetings. Send invitations to engineers, contractors, soil/watershed groups, etc. Host meetings.	April to May 2007	Fellow, Engineers, PIO	
STEP	Put "Draft" final Lake Erie Shore Protection Management Plan" on-line and downloadable as a PDF.	Place Draft Manual on-line.	April to May 2007	PIO, Fellow, Communications.	
STEP	Give the public a 60 day time frame to comment on the publication.	Reminder Press Release about the public comment period and that draft LESEMP is available on-line.	May 2007 and 60 days thereafter	PIO, Fellow	
STEP	Announce availability of final plan.	Press Release announcing availability of final plan.	July-August 2007	Engineers, PIO, Fellow	
STEP	Schedule meetings with locals and educate them on how to use it.	Meetings held, (may be in conjunction with CCI.	August and ongoing	All	

LESEMP will aid local communities and individual property owners in addressing Lake-based erosion and flooding concerns, while resulting in the restoration of the shore and nearshore habitats and resources along Ohio's Lake Erie coast. The plan will also be used by the Office of Coastal Management to support policy development that will focus on protecting and restoring valuable coastal property.